EXHIBIT H-6. EXAMPLE 5. LEWIS COUNTY BOTTOMLAND RESTORATION, KENTUCKY

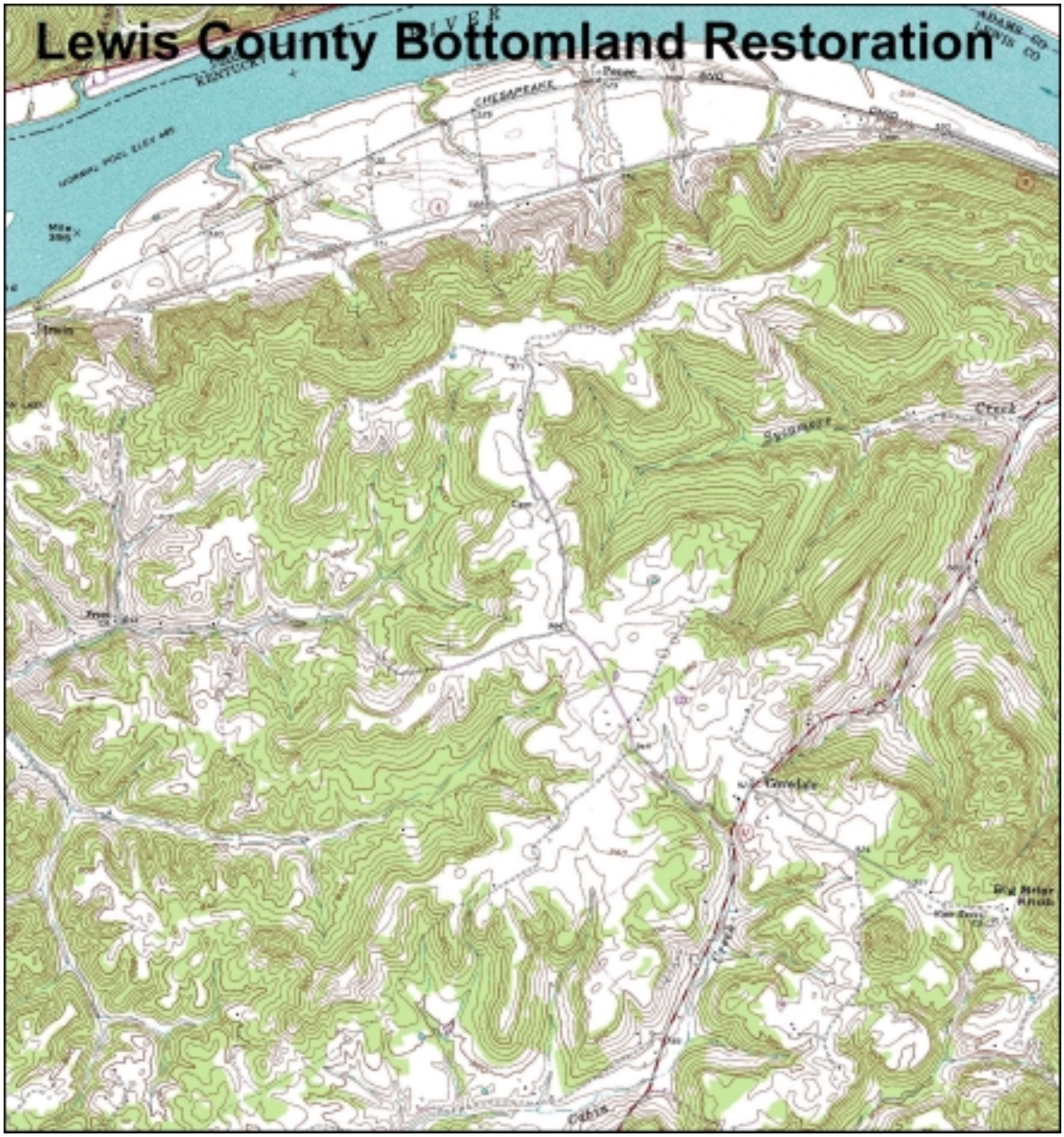
7.1 Description of Project and Impacts
7.2 Incremental Analysis

EXHIBIT H-6

7.1 Lewis County Bottomland Restoration (KY-31)

1.0 Location

The proposed Lewis County Bottomland Restoration project area is located in Lewis County, Kentucky. The project area is located northeast of the town of Covedale, Kentucky. The project area is located between Ohio River miles 391-396. The project site is within the jurisdiction of the Huntington District, U.S. Army Corps of Engineers (USACE).



2.0 Project Goal

The primary goal of the Lewis County project is the acquisition, restoration, and reforestation of approximately 785 acres of bottomland hardwoods and the restoration of a riparian corridor along the Ohio River. Another goal for the Lewis County project addresses the restoration of upland forest habitat within the project area. Long term restoration efforts will include

reforestation of bottomland hardwoods, development of seasonally flooded impoundments, and the restoration of natural systems throughout the floodplain.

3.0 Project Description and Rationale

The Lewis County Bottomland Restoration project area consists of approximately 2600 acres of upland habitat and 785 acres of Ohio River bottomland habitat in Lewis County, Kentucky.

The bottomland portion of the project area is the first priority for acquisition, followed by the upland area. All project lands will be acquired from willing sellers.

A portion of the floodplain area would be reforested with a mixture of mast producing bottomland hardwood trees, and the entire area will be managed to provide habitat diversity for game and non-game wildlife. A portion of the project area will be maintained as open habitat such as warm season grasslands, food plots, or other wildlife openings. Future development would include the construction/development of moist soil units and/or other wetlands.

4.0 Existing Conditions

Terrestrial/Riparian Habitat: Approximately 2,600 acres of the site is upland habitat.(This area would require implementation by agency other than the Corps of Engineers. (Corps policy prevents participation in projects in uplands.) The upland area is dominated by old fields, pasture and hayfields, reforested pine communities, mixed upland hardwood draws, and agricultural fields. The primary crops grown on the site are tobacco, corn, and soybeans.

The floodplain area is primarily agricultural with a mixture of pasture, hayfield, and row crops. A narrow band of riparian vegetation exists along a low terrace of the Ohio River floodplain.

Aquatic Habitats: The watershed for the upland area is drained by several small creeks that meander through the site and empty into the Ohio River. The Ohio River borders the northern

edge of the site between river miles 391-395. Some small ponds and embayments exist on the bottomland area adjacent to the Ohio River.

Wetlands: Most of the jurisdictional wetlands in the project area are associated with the bottomland hardwoods in the riparian zone adjacent to the Ohio River. In addition, there may be a few isolated wetlands within the project area, especially adjacent to the interior drainage ways. There are no significant or unique wetlands within the project area.

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 9 federally-listed endangered species and 1 federally-listed threatened species known to occur in Lewis County, Kentucky. These species are listed on Table 1.

The riparian corridor adjacent to the Ohio River may provide summer roost habitat for the Indiana bat. Preferred tree species would include a mixture of oaks (*Quercus* spp.), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and shagbark hickory (*Carya ovata*) (INHS, 1996). The riparian corridor would also provide feeding/foraging habitat for the Indiana bat.

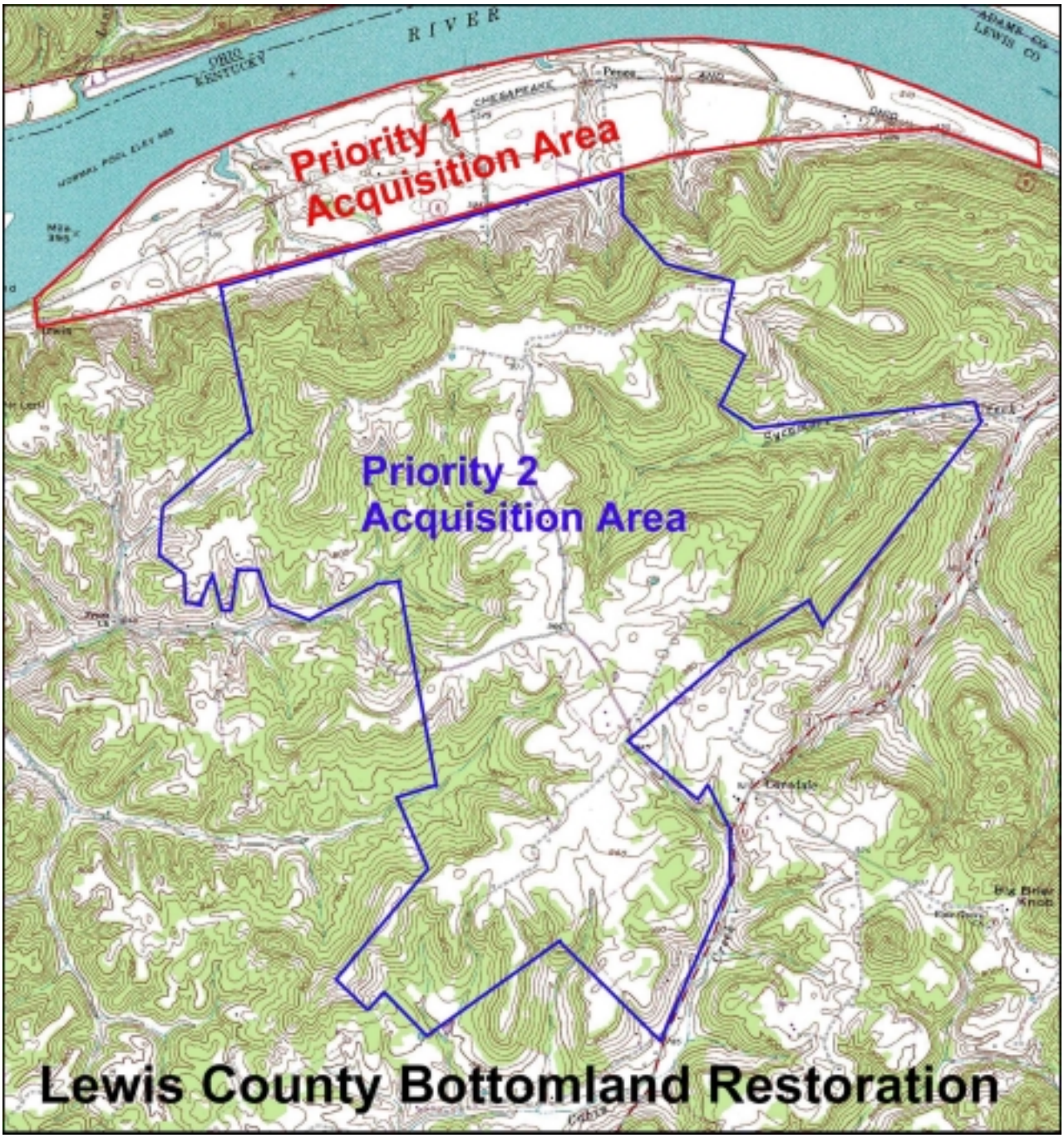
All of the mussels are freshwater species that typically inhabit medium to large river systems. The mussels are typically found in habitats with substrates that range from silt to gravel, and in water depths from 0.5 to 8.0 meters. These species are generally associated with moderate to fast flowing water. There does not appear to be suitable habitat for these species in the immediate vicinity of the project area.

Virginia spiraea occurs in rocky, flood scoured riverbanks in gorges and canyons. There does not appear to be suitable habitat for this species in the project area.

According to the USFWS, it is believed that the eastern cougar has been extirpated from Kentucky. Much of the cougar's habitat has been eliminated through deforestation and development. The primary habitat needs for the cougar are large wilderness areas and adequate food sources. Due to lack of suitable habitat, it is highly unlikely that this species exists near the project area.

Table 1. Federally-listed species known to occur in Lewis County, Kentucky.			
Common Name	**Scientific Name**	**Federal Status**	**Potential Habitat Present**
eastern cougar	*Felis concolor couguar*	Endangered	No
Indiana bat	*Myotis sodalis*	Endangered	Yes
rough pigtoe mussel	*Pleurobema plenum*	Endangered	No
orange-foot pimpleback pearly mussel	*Plethobasus cooperianus*	Endangered	No
eastern fanshell pearly mussel	*Cyprogenia stegaria*	Endangered	No
tubercled blossom mussel	*Epioblasma torulosa torulosa*	Endangered	No
pink mucket pearly mussel	*Lampsilis abrupta*	Endangered	No
ring pink mussel	*Obovaria retusa*	Endangered	No
purple cat's paw pearly mussel	*Epioblasma obliquata obliquata*	Endangered	No
Virginia spiraea	*Spiraea virginiana*	Threatened	No
Source: U.S. Fish and Wildlife Service, 1999			

5.0 Project Diagram



6.0 Land Acquisition and Reforestation Strategy

Land acquisition for the Lewis County Bottomland Restoration project area will be completed in a two-phase approach that assigns a hierarchy for land purchases. Although the goal is to purchase any lands from willing sellers within the project area, the acquisition areas will be assigned two levels of priority.

Priority 1 Area: The lands that lie between State Route 8 and the Ohio River, as shown in the red border on the project diagram, would be considered the first priority for purchase since this area includes floodplain land. It should be noted that this type project would receive low priority

because it is primarily an acquisition project with limited engineering work. (This type project does not meet Corps Policy. The project would receive low priority). It is assumed that other partners besides the Corps would implement this type of project. There are approximately 785 acres within the Priority 1 Acquisition Area (see Project Diagram in section 5.0). The acquisition area excludes public utilities, roads, railroads, cemeteries, residences, and other features, which would not be readily restored to a natural state.

The Priority 1 area contains all of the Ohio River floodplain habitat for the Lewis County Bottomland Restoration project. Approximately 250 acres would be reforested in the Priority 1 area. Soil types, hydrology, exposure, and terrain position would be the primary factors considered when selecting the tree species to be planted, and a detailed planting design should be developed in order to insure that the planting effort is successful. Typical species to be planted in the bottom/floodplain area would include pin oak (*Quercus palustris*), swamp chestnut oak (*Quercus michauxii*), swamp white oak (*Quercus bicolor*), pecan (*Carya illinoensis*), and shagbark hickory (*Carya ovata*). Aggressive light mast producing species, such as silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), and/or black willow (*Salix nigra*), would be expected to regenerate naturally.

Priority 2 Area: Note: The Corps cannot participate in a project to acquire upland areas for restoration because of Policy. Under the preferred ecosystem restoration program alternative the Corps would not be able to financially partner in a project primarily dealing with upland areas. Other interested groups may wish to pursue the project. The purpose of showing this area is to illustrate what can't be completed though the Corps yet is of high interest at the state level and with U.S. Fish and Wildlife service. The lands that lie south of State Route 8 and to the west of State Route 57 would be considered the second priority for acquisition. There are approximately 2600 acres within the Priority 2 Acquisition Area (see Project Diagram in section 5.0). The acquisition area excludes public utilities, roads, railroads, cemeteries, residences, and other features, which would not be readily restored to a natural state.

The Priority 2 area is predominantly upland habitat. Portions of the upland areas that are currently in pasture and agricultural production would be reforested with a variety of native mast producing hardwood species. There are currently some pine plantings on the upland area. Approximately 300 acres of the Priority 2 area would be reforested. Typical species would include white oak (*Quercus alba*), post oak (*Quercus stellata*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), pin oak (*Quercus palustris*), mockernut hickory (*Carya tomentosa*), shagbark hickory (*Carya ovata*), and pecan (*Carya illinoensis*). Light mast producing species would be expected to repopulate the area naturally.

Open areas that are not reforested will be maintained in order to provide habitat diversity. These open areas may be maintained by mowing, burning, and/or tilling. Depending upon the type of wildlife management prescribed in the project management plan, other opening such as foodplots may be desirable.

7.0 Cost Estimate (Land Acquisition and Reforestation)

Reforestation - Engineering costs for the proposed project are contained on Table 1. A detailed MCACES cost estimate for the proposed project is included in Appendix D.

Table 2. Project Costs.	
Item	**Cost**
Prepare Project Management Plan	$25,000
Priority 1 Land Acquisition (785 acres)(Low priority)	$1,552,000
Reforestation on Priority 1 Area (250 acres)(Low priority	$54,800
Priority 2 Land Acquisition (2600 acres)(Funded by Others)	----------
Reforestation on Priority 2 Area (300 acres)(Funded by Others)	----------
Mobilization for Reforestation @ 12.5%	$15,200
TOTAL	**$1,622,000**

8.0 Schedule

Land Acquisition: The estimated acquisition and development time for this project is shown on Table 3.

Table 3. Acquisition and Development Schedule.	
Item	**Time**
Project Management Plan	1 year
Priority 1 Acquisition	1-5 years
Priority 1 Reforestation and Development	1-8 years
Priority 2 Acquisition(100% Nonfederal responsibility)	1-15 years
Priority 2 Reforestation and Development (100% nonfederal)	1-20 years
TOTAL	**15 years**

9.0 Expected Ecological Benefits

Terrestrial/Riparian Habitat: Habitat restoration on the Lewis County project area would result in long term beneficial impacts to terrestrial and riparian resources. The restoration of the existing riparian corridor along the Ohio River would be considered a long-term beneficial impact to terrestrial/riparian resources. The reforestation, and management of the floodplain/riparian area would be beneficial to many game and nongame species of wildlife.

The reforestation, preservation, and management of bottomland and upland areas would benefit many species of wildlife. Reforestation would reduce overall forest fragmentation on the area and provide habitat for many species. Likely species to be beneficially affected would include: resident bird species, such as northern bobwhite and turkey; neotropical migratory birds, such as warblers, vireos, and sparrows; and raptors, such as red-tailed hawk, northern harrier, sharp-shinned hawk, and barred owl. Resident mammals, such as white-tailed deer, eastern cottontail, and eastern gray squirrel; and resident reptiles and amphibians would also benefit from the proposed project. In addition, important long-term beneficial impacts to migratory waterfowl, especially wood ducks and mallards would be anticipated.

Management of upland areas on the project site would also allow managers to implement watershed management strategies. Strategies such as reforestation of agricultural lands in the upland areas would reduce erosion and runoff entering the watershed.

Aquatic Habitats: Seasonally flooded habitats that are created on the project area will provide refuge, nursery, and foraging habitat for a number of riverine fish species. Reforestation of bottomland areas would reduce runoff rates and decrease the sediment loads entering the watershed. Long-term beneficial impacts to aquatic resources would be anticipated as a result of implementing the proposed project. The preservation and reforestation of the wooded riparian corridor along the Ohio River shoreline would reduce potential stream bank erosion. The conversion of agricultural land to forest would indirectly improve water quality by reducing the amount of silt and contaminants from entering the Ohio River via stormwater runoff

Wetlands: Restoration and creation of bottomland hardwood wetlands, moist-soil units, and other seasonally flooded habitats would add to the amount of wetlands present on the project area. The benefits of these newly created/restored wetlands would include improved water quality, floodflow retention/reduction, groundwater recharge, and provide habitat for waterfowl and other wetland dependent species. As recommended by the USFWS, moist-soil units would not be placed in existing wetlands or in any of the on-site creeks.

Federally-Listed Threatened and Endangered Species: Implementation of the proposed project would potentially create habitat for the Indiana bat in the long term. Reforestation would provide potential summer roost habitat for Indiana bats. Bottomland hardwood restoration, reforestation, protection, and long-term management would benefit endangered Indiana bats by providing summer roost and foraging habitat on the project area. Control of bank erosion would reduce sedimentation inputs into the river and potentially reduce impacts to endangered mussel species downstream of the project area.

Socioeconomic Resources: There would be long-term beneficial impacts to socioeconomic resources as a result of implementing the proposed project. Long-term socioeconomic benefits would be realized through improved recreational opportunities for hunting, fishing, wildlife observation, and other non-consumptive uses. Local businesses would receive indirect benefits from local expenditures associated with outdoor recreation purchases, such as hunting gear, fishing supplies, gas, food, and other needs.

10.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitat: There would be no reasonably foreseeable adverse impacts to terrestrial or riparian resources as a result of implementing the proposed project.

Aquatic Habitats: There would be no reasonably foreseeable adverse impacts to aquatic resources as a result of implementing the proposed project.

Wetlands: There would be no reasonably foreseeable adverse impacts to jurisdictional wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no reasonably foreseeable adverse impacts to federally-listed threatened or endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be long-term direct adverse socioeconomic impacts to local farmers as a result of implementing the proposed project. There would be indirect long-term adverse impacts to local businesses that support the agricultural community.

11.0 Mitigation

No mitigation would be necessary to implement this project.

12.0 Preliminary Operation and Maintenance Costs:

The operation and maintenance costs associated with the Lewis County Bottomland Restoration project would be correlated to the amount of active management on the area. Labor would be the primary cost associated with the long-term management of the Lewis County area.

13.0 Potential Cost Share Sponsor(s)

- Kentucky Department of Fish and Wildlife Resources
- Kentucky Division of Forestry
- Kentucky Land Heritage Trust
- North American Conservation Plan
- The Nature Conservancy
- Ducks Unlimited
- Partners In Flight
- Mellon Foundation

14.0 Expected Life of the Project

It is anticipated that the Lewis County Bottomland Restoration project area will be managed for natural resources by the Kentucky DNR in perpetuity.

15.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit and further assessed via a database search of HTRW records in the site area.

Site Inspection Findings

The project area comprises a large area of bottomland extending for about 3.5 miles along the south shoreline of the Ohio River between river miles 391.5 to 395.3. The bottomland protrudes inland (south) for about 3.5 miles. The area is located in Lewis County, Kentucky. The small towns of Pence and Irwin, Kentucky are respectively located on the east and west sides of that portion of the bottomland found on the south shore of the Ohio River.

The following environmental conditions were considered when conducting the July 13, 1999 project area inspection:

- Suspicious/Unusual Odors;
- Discolored Soil;
- Distressed Vegetation;
- Dirt/Debris Mounds;
- Ground Depressions;
- Oil Staining;
- Above Ground Storage Tanks (ASTs);
- Underground Storage Tanks (USTs);
- Landfills/Wastepiles;
- Impoundments/Lagoons;
- Drum/Container Storage;
- Electrical Transformers;
- Standpipes/Vent pipes;
- Surface Water Discharges;
- Power or Pipelines;
- Mining/Logging; and
- Other.

A mixture of wetlands, agricultural lands consisting of pastures and row crops, and upland forests are in the project area. None of the environmental conditions listed above were observed in the project area.

Risk Management Data Search

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The search complied with ASTM Standard Practice for Environmental Site Assessments, E 1527-97. This search report is presented in Appendix B. Included in Appendix B is a map outlining the boundary of the database search. As shown on the map, the area searched for HTRW conditions included the project area and a parameter extending one mile beyond the project boundary. Databases searched (e.g., USTs, NPL sites, etc.) are as follows:

Databases Searched:
1. **NPL:** National Priority List
2. **Delisted NPL:** Contaminated sites removed from the NPL.
3. **RCRIS-TSD:** Resource Conservation and Recovery Information System
4. **SHWS:** State Hazardous Waste Sites
5. **CERCLIS:** Comprehensive Environmental Response, Compensation, and Liability Information System
6. **CERC-NFRAP:** Comprehensive Environmental Response, Compensation, and Liability Information System
7. **CORRACTS:** Corrective Action Report
8. **SWF/LF:** Available Disposal for Solid Waste in Illinois- Solid Waste Landfills Subject to State Surcharge
9. **LUST:** Leaking Underground Storage Tank
10. **UST:** Underground Storage Tank
11. **RAATS:** RCRA Administrative Tracking System
12. RCRIS-SQG: Resource Conservation and Recovery Information System for Small Quantity Generators
13. **RCRIS-LQG:** Resource Conservation and Recovery Information System for Large Quantity Generators
14. **HMIRS:** Hazardous Materials Reporting System
15. **PADS:** PCB Activity Database System
16. **ERNS:** Emergency Response Notification System
17. **FINDS:** Facility Index System/Facility Identification Initiative program Summary Report
18. **TRIS:** Toxic Chemical Release Inventory System
19. **NPL Lien:** NPL Liens
20. **TSCA:** Toxic Substances Control Act
21. **MLTS:** Material Licensing Tracking System
22. **ROD:** Record of Decision
23. **CONSENT:** Superfund (CERCLA) Consent Decrees
24. **MINES:** Mines Master Index File

The HTRW database search did not identify any of the above environmental conditions in the project area.

HTRW Findings and Conclusions

An Inspection of the project site and a search of environmental records relevant to the project site, and extended areas beyond, have revealed no evidence of recognized environmental conditions in connection with this project site.

16.0 References

References:	
USFWS, 1999	U.S. Fish and Wildlife Service, July 8, 1998. Federally Endangered, Threatened and Proposed Species, Kentucky.

APPENDIX A Threatened & Endangered Species

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

August 6, 1999

Ms. Karen Boulware
Parsons Harland Bartholomew
& Associates, Inc.
400 Woods Mill Road South
Suite 330
Chesterfield, Missouri 63017-3427

Re: FWS #99-2047

Dear Ms. Boulware:

Thank you for your facsimile of July 13, 1999, requesting lists of federally endangered and threatened species for 13 counties in Kentucky. The enclosed list includes current and historic records for listed species in the counties requested. Please note the comment at the bottom of the list regarding the red wolf and eastern cougar.

If you have any questions or if we can be of further assistance, please contact Jim Widlak of my staff at 931/528-6481, ext. 202.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

Enclosure

KENTUCKY COUNTY DISTRIBUTION RECORDS**
OF ENDANGERED AND THREATENED SPECIES
August 5, 1999

** These county lists contain species currently known to occur in the county and those for which only historical records exist.

Boone County

Bald eagle - Haliaeetus leucocephalus (T)

Pink mucket pearly mussel - Lampsilis orbiculata (E)
Ring pink - Obovaria retusa (E)

Running buffalo clover - Trifolium stoloniferum (E)

Bracken County

Clubshell - Pleurobema clava (E)

Crittenden County

Indiana bat - Myotis sodalis (E)
Gray bat - Myotis grisescens (E)
Red wolf - Canis rufus (E)

Bald eagle - Haliaeetus leucocephalus (T)

Orange-footed pearly mussel - Plethobasus cooperianus (E)
Fat pocketbook - Potamilus capax (E)

Daviess County

Indiana bat - Myotis sodalis (E)

Bald eagle - Haliaeetus leucocephalus (T)

Gallatin County

Indiana bat - Myotis sodalis (E)

White wartyback pearly mussel - Plethobasus cicatricosus (E)
Clubshell - Pleurobema clava (E)

Greenup County

Indiana bat - Myotis sodalis (E)

Pink mucket pearly mussel - Lampsilis orbiculata (E)
Ring pink - Obovaria retusa (E)
Fanshell - Cyprogenia stegaria (E)

Henderson County

Indiana bat - Myotis sodalis (E)
Eastern cougar - Felis concolor couguar (E)

(American) peregrine falcon - Falco peregrinus anatum (E)
Bald eagle - Haliaeetus leucocephalus (T)

American burying beetle - Nicrophorus americanus (E)

Pink mucket pearly mussel - Lampsilis orbiculata (E)
White wartyback pearly mussel - Plethobasus cicatricosus (E)
Tuberculed-blossom pearly mussel - Epioblasma torulosa torulosa (E)
Fat pocketbook - Potamilus capax (E)
Ring pink - Obovaria retusa (E)
Purple cat's paw pearly mussel - Epioblasma sulcata sulcata (E)
Fanshell - Cyprogenia stegaria (E)

Jefferson County

Gray bat - Myotis grisescens (E)
Indiana bat - Myotis sodalis (E)

Bald eagle - Haliaeetus leucocephalus (T)
Least tern (interior population) - Sterna antillarum (E)
Piping plover - Charadrius melodus (T)

Pink mucket pearly mussel - Lampsilis orbiculata (E)

Jefferson County (cont'd)

Orange-footed pearly mussel - Plethobasus cooperianus (E)
Fat pocketbook - Potamilus capax (E)
Ring pink - Obovaria retusa (E)
Cracking pearly mussel - Hemistena lata (E)
Fanshell - Cyprogenia stegaria (E)
Clubshell - Pleurobema clava (E)

Running buffalo clover - Trifolium stoloniferum (E)
Short's goldenrod - Solidago shortii (E)

Lewis County

Eastern cougar - Felis concolor couguar (E)
Indiana bat - Myotis sodalis (E)

Rough pigtoe - Pleurobema plenum (E)
Orange-footed pearly mussel - Plethobasus cooperianus (E)
Pink mucket pearly mussel - Lampsilis orbiculata (E)
Tuberculed-blossom pearly mussel - Epioblasma torulosa torulosa (E)
Purple cat's paw pearly mussel - Epioblasma sulcata sulcata (E)
Fanshell - Cyprogenia stegaria (E)
Ring pink - Obovaria retusa (E)

Virginia spiraea - Spiraea virginiana (T)

Livingston County

Gray bat - Myotis grisescens (E)
Indiana bat - Myotis sodalis (E)

Bald eagle - Haliaeetus leucocephalus (T)
Least tern (interior population) - Sterna antillarum (E)

Fat pocketbook - Potamilus capax (E)
Orange-footed pearly mussel - Plethobasus cooperianus (E)
Pink mucket pearly mussel - Lampsilis orbiculata (E)
Clubshell - Pleurobema clava (E)
Fanshell - Cyprogenia stegaria (E)
White wartyback pearly mussel - Plethobasus cicatricosus (E)
Ring pink - Obovaria retusa (E)

Price's potato bean - Apios priceana (T)

Meade County

Gray bat - Myotis grisescens (E)
Indiana bat - Myotis sodalis (E)

Bald eagle - Haliaeetus leucocephalus (T)

Oldham County

Indiana bat - Myotis sodalis (E)

Bald eagle - Haliaeetus leucocephalus (T)

Winged mapleleaf - Quadrula fragosa (E)

Union County

Indiana bat - Myotis sodalis (E)

Bald eagle - Haliaeetus leucocephalus (T)
Least tern (interior population) - Sterna antillarum (E)
Piping plover - Charadrius melodius (T)

Fat pocketbook - Potamilus capax (E)

E = Endangered
T = Threatened

NOTE: The red wolf and eastern cougar are considered to be extirpated from Kentucky. We maintain them on our records because they have not been officially declared extinct. The red wolf has been reintroduced into several areas in an attempt to establish breeding populations. We do not expect agencies to consult on either of these species until confirmed reports are received.

All of the counties on this list are considered to be within the known maternity range of the Indiana bat. The Service assumes that maternity colonies may occur anywhere in these counties where suitable habitat exists.

There is no designated critical habitat in these counties for any of the species on this list.

APPENDIX B Hazardous Toxic and Radiological Wastes

The EDR Area Study Report

Study Area
Lewis County
Pence, Kentucky

July 21, 1999

Inquiry number 392891.1s

Environmental Data Resources, Inc.
an edr company

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06490

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR).

The address of the subject property for which the search was intended is:

LEWIS COUNTY
PENCE, KY 41131

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records within the requested search area for the following Databases:

NPL:	National Priority List
Delisted NPL:	NPL Deletions
RCRIS-TSD:	Resource Conservation and Recovery Information System
SHWS:	State Haz. Waste
CERCLIS:	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP:	Comprehensive Environmental Response, Compensation, and Liability Information System
CORRACTS:	Corrective Action Report
SWF/LF:	Solid Waste Facilities List
UST:	Underground Storage Tank Database
RAATS:	RCRA Administrative Action Tracking System
RCRIS-SQG:	Resource Conservation and Recovery Information System
RCRIS-LQG:	Resource Conservation and Recovery Information System
HMIRS:	Hazardous Materials Information Reporting System
PADS:	PCB Activity Database System
ERNS:	Emergency Response Notification System
FINDS:	Facility Index System/Facility Identification Initiative Program Summary Report
TRIS:	Toxic Chemical Release Inventory System
NPL Lien:	NPL Liens
TSCA:	Toxic Substances Control Act
MLTS:	Material Licensing Tracking System
ROD:	ROD
CONSENT:	Superfund (CERCLA) Consent Decrees
MINES:	Mines Master Index File

Unmapped (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

Please refer to the end of the findings report for unmapped orphan sites due to poor or inadequate address information.

MAP FINDINGS SUMMARY

Database	Total Plotted
NPL	0
Delisted NPL	0
RCRIS-TSD	0
State Haz. Waste	0
CERCLIS	0
CERC-NFRAP	0
CORRACTS	0
State Landfill	0
LUST	N/A
UST	0
RAATS	0
RCRIS Sm. Quan. Gen.	0
RCRIS Lg. Quan. Gen.	0
HMIRS	0
PADS	0
ERNS	0
FINDS	0
TRIS	0
NPL Liens	0
TSCA	0
MLTS	0
ROD	0
CONSENT	0
MINES	0

* Sites may be listed in more than one database

MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.) Site

EDR ID Number
Database(s) EPA ID Number

Coal Gas Site Search: EDR does not presently have coal gas site information available in this state.

NO SITES FOUND

OR AMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	Facility ID
MANCHESTER	1001080535	ASHLAND BRANDED MARKETING INC	RT 41	45144	RCRIS-SQG, FINDS	
MANCHESTER	S101704869	578 - M TAYLOR	RT 41	45144	LUST	10101
MANCHESTER	S103422553	DAYTON POWER & LIGHT CO.	14869 US ROUTE 52	45144	LUST	16870
MANCHESTER	U000869230	DAYTON POWER & LIGHT CO.	14869 US ROUTE 52	45144	UST	0-016870
MANCHESTER	S102271764	KILLEN POWER PLANT	14869 ST RT 52	45144	LUST	690001
MANCHESTER	1000258600	SOHIO MANCHESTER BULK 528	WEST SECOND ST & RT 22	45144	RCRIS-SQG, FINDS	
ROLLESBORO	1000516606	ASHLAND BRANDED MARKETING INC	ROUTE 1	41189	RCRIS-SQG, FINDS, UST	2899068
TOLLESBORO	U000201265	HARRISON GROCERY	3458 RT 1 TOLLESBORO	41189	UST	1013068
TOLLESBORO	U000810604	OLD K & D SAVE ALOT	HWY 10	41189	UST	1020068
TOLLESBORO	U001180730	LANCASTER TIRE SHOP	RTE 10	41189	UST	2090068
TOLLESBORO	U001623883	TOLLESBORO CO	RTE 111	41189	UST	2959068
TOLLESBORO	1000663903	ASHLAND BRANDED MARKETING 558-	RT 57 ON RT 1237	41189	RCRIS-SQG, FINDS	
TOLLESBORO	1000667353	ASHLAND PETROLEUM 558-001	ST RT 10	41189	RCRIS-SQG, FINDS	
VANCEBURG	U001184736	VANCEBURG KY BULK PLANT 558	RT 1	41189	UST	7007068
VANCEBURG	U001184838	M & W GROCERY	STATE RT 8	41131	UST	7785068
WRIGHTSVILLE	1000416786	DAYTON PWR AND LT CO KILLEN ST	US RTE 52	45144	FINDS, RCRIS-LQG	

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM RECORDS:

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 04/21/99
Date Made Active at EDR: 06/09/99
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 05/14/99
Elapsed ASTM days: 26
Date of Last EDR Contact: 05/14/99

ERNS: Emergency Response Notification System
Source: EPA/NTIS
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/98
Date Made Active at EDR: 01/18/99
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 01/13/99
Elapsed ASTM days: 5
Date of Last EDR Contact: 05/12/99

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC).

Date of Government Version: 05/10/99
Date Made Active at EDR: 06/09/99
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/12/99
Elapsed ASTM days: 28
Date of Last EDR Contact: 05/12/99

RCRIS: Resource Conservation and Recovery Information System
Source: EPA/NTIS
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

Date of Government Version: 04/26/99
Date Made Active at EDR: 06/09/99
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/14/99
Elapsed ASTM days: 26
Date of Last EDR Contact: 05/14/99

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/01/99
Date Made Active at EDR: 04/16/99
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 03/17/99
Elapsed ASTM days: 30
Date of Last EDR Contact: 06/21/99

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FEDERAL NON-ASTM RECORDS:

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/95
Database Release Frequency: Biennially

Date of Last EDR Contact: 03/25/99
Date of Next Scheduled EDR Contact: 06/21/99

CONSENT: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Telephone: Varies
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: Varies
Database Release Frequency: Varies

Date of Last EDR Contact: Varies
Date of Next Scheduled EDR Contact: N/A

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report
Source: EPA
Telephone: N/A
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/01/99
Database Release Frequency: Quarterly

Date of Last EDR Contact: 04/16/99
Date of Next Scheduled EDR Contact: 07/12/99

HMIRS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Telephone: 202-366-4526
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/97
Database Release Frequency: Annually

Date of Last EDR Contact: 03/24/99
Date of Next Scheduled EDR Contact: 07/26/99

MLTS: Material Licensing Tracking System
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 12/08/98
Database Release Frequency: Quarterly

Date of Last EDR Contact: 04/13/99
Date of Next Scheduled EDR Contact: 07/12/99

NPL LIENS: Federal Superfund Liens
Source: EPA
Telephone: 205-564-4267
Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 05/28/98
Date of Next Scheduled EDR Contact: 08/23/99

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PADS: PCB Activity Database System
Source: EPA
Telephone: 202-260-3936
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 09/22/97
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 05/27/99
Date of Next Scheduled EDR Contact: 08/16/99

RAATS: RCRA Administrative Action Tracking System
Source: EPA
Telephone: 202-564-4104
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 06/14/99
Date of Next Scheduled EDR Contact: 09/13/99

ROD: Records Of Decision
Source: NTIS
Telephone: 703-416-0223
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/31/99
Database Release Frequency: Annually

Date of Last EDR Contact: 05/25/99
Date of Next Scheduled EDR Contact: 07/19/99

TRIS: Toxic Chemical Release Inventory System
Source: EPA
Telephone: 202-260-1531
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/97
Database Release Frequency: Annually

Date of Last EDR Contact: 05/07/99
Date of Next Scheduled EDR Contact: 08/28/99

TSCA: Toxic Substances Control Act
Source: EPA
Telephone: 202-260-1444
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/94
Database Release Frequency: Every 4 Years

Date of Last EDR Contact: 04/26/99
Date of Next Scheduled EDR Contact: 07/26/99

MINES: Mines Master Index File
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

Date of Government Version: 08/01/98
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 04/08/99
Date of Next Scheduled EDR Contact: 07/05/99

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STATE OF KENTUCKY ASTM RECORDS:

LUST: N/A
Source: Department of Environmental Protection
Telephone: 502-564-6716
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: N/A
Date Made Active at EDR: N/A
Database Release Frequency: No Update Planned

Date of Data Arrival at EDR: N/A
Elapsed ASTM days: 0
Date of Last EDR Contact: 05/18/99

SHWS: State Leads List
Source: Department of Environmental Protection
Telephone: 502-564-6716
State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 12/28/98
Date Made Active at EDR: 02/15/99
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 01/14/99
Elapsed ASTM days: 32
Date of Last EDR Contact: 04/05/99

LF: Solid Waste Facilities List
Source: Department of Environmental Protection
Telephone: 502-564-6716
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 02/01/99
Date Made Active at EDR: 04/01/99
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 03/01/99
Elapsed ASTM days: 31
Date of Last EDR Contact: 05/24/99

UST: Underground Storage Tank Database
Source: Department of Environmental Protection
Telephone: 502-564-6716
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 02/08/99
Date Made Active at EDR: 06/17/99
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 05/18/99
Elapsed ASTM days: 30
Date of Last EDR Contact: 04/05/99

Historical and Other Database(s)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

Disclaimer Provided by Real Property Scan, Inc.

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

DELISTED NPL: NPL Deletions
Source: EPA
Telephone: N/A
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 04/23/99
Date Made Active at EDR: 06/09/99
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 06/12/99
Elapsed ASTM days: 28
Date of Last EDR Contact: 02/08/99

NFRAP: No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 04/21/99
Date Made Active at EDR: 06/09/99
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 05/14/99
Elapsed ASTM days: 26
Date of Last EDR Contact: 05/14/99

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-260-2805
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-260-2805
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SWDIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

Area Radon Information: The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones: Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Oil/Gas Pipelines/Electrical Transmission Lines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines and electrical transmission lines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

USGS Water Wells: In November 1971 the United States Geological Survey (USGS) implemented a national water resource information tracking system. This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on more than 900,000 wells, springs, and other sources of groundwater.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in March 1997 from the U.S. Fish and Wildlife Service.

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Water Dams: National Inventory of Dams
Source: Federal Emergency Management Agency
Telephone: 202-646-2801
National computer database of more than 74,000 dams maintained by the Federal Emergency Management Agency.

Kentucky Well Data Files
Source: University of Kentucky, Geological Survey
Telephone: 606-257-5500

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

APPENDIX C Plan Formulation and Incremental Analysis Checklist

Project Site Location: The proposed Lewis County Bottomland Restoration project area is located in Lewis County, Kentucky. The project area is located northeast of the town of Covedale, Kentucky. The project area is located between Ohio River miles 391-396. The project site is within the jurisdiction of the Huntington District, U.S. Army Corps of Engineers (USACE).

Description of Plan: The primary goal of the Lewis County project is the acquisition, restoration, and reforestation of approximately 785 acres of bottomland hardwoods, including seasonally flooded sloughs and a riparian corridor along the Ohio River. Another goal for the Lewis County project addresses the restoration of upland forest habitat within the project area. Long term restoration efforts will include reforestation of bottomland hardwoods, development of seasonally flooded impoundments, and the restoration of natural systems throughout the floodplain.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? Yes and description

Reduce the amount of land to be restored.

Larger Size Plan Possible? Yes and description

Increase the size and number of seasonally flooded areas.

Other alternatives? No

Restore/Enhance/Protect Terrestrial Habitats? Yes **Opportunity numbers met** T1, T3

Restore, Enhance, & Protect Wetlands? Yes **Opportunity numbers met** W1, W4

Restore/Enhance/Protect Aquatic Habitats? Yes **Opportunity numbers met** A8

Type species benefited: Resident and migratory wildlife, including terrestrial and avian species, fish and invertebrates including mussels.

Endangered species benefited: Potential benefits to Indiana bats and endangered mussels.

Can estimated amount of habitat units be determined:

Plan acceptable to Resources Agencies?
U.S. Fish & Wildlife Service?
State Department of Natural Resources? Yes – Kentucky Department of Fish and Wildlife

Plan considered complete? Yes **Connected to other plans for restoration?**

Real Estate owned by State Agency? No **Federal Agency?** No
Real Estate privately owned? Yes
If privately owned, what is status of future acquisition? Acquisition would be required from willing sellers.

Terrestrial Habitat Opportunities

T1 Restore riparian corridors, reduce fragmentation by expanding and joining isolated habitat blocks and stabilize eroding banks.

T2 Restore, protect existing islands and create islands where they historically occurred.

T3 Restore hardwood forests in the 100-year floodplain.

Wetland Habitat Opportunities

W1 Forested Wetlands: Restore Forested Wetlands: Bottomland Hardwoods

W2 Forested Wetlands: Restore Forested Wetlands:Cypress/Tupelo Swamps and other unique forested wetlands

W3 Restore Scrub/Shrub Emergent Wetlands: including those areas isolated from the river except during high water and those contiguous with embayments and island sloughs.

Aquatic Habitat Opportunities

A1 Restore backwaters (Including sloughs, embayments, oxbows, bayous, etc.).

A2 Restore riverine submerged and emergent aquatic vegetation

A3 Restore and protect sand and gravel bars.

A4 Protect tailwaters and provide structures to provide refuge for fish.

A5 Create and protect fish and mussel refuges in pools (deep water, slow velocity, soft substrate)

A6 Restore and protect aquatic habitat (Side Channel/Back Channel Habitat)

Other

O-1 Restore other habitats(e.g., canebrakes, river bluffs mussel beds, etc.)

APPENDIX D Micro Computer-Aided Cost Engineering System (MCACES)

Lewis County
Ohio River Mainstem
Ecosystem Restoration Project

Sample Feasibility Cost Estimate

Designed By: Parsons Engineering Science, Inc
Estimated By:

Prepared By: Parsons Engineering/CELRL-ED-MC
CELRL-ED-MC POC: M. Lockard

Preparation Date: 06/20/00
Effective Date of Pricing: 06/20/00
Est Construction Time: 180 Days

Sales Tax: 6.00%

M C A C E S G O L D E D I T I O N
Composer GOLD Software Copyright (c) 1985-1994
by Building Systems Design, Inc.
Release 5.30A

ABOR ID: FTCAMP EQUIP ID: NAT97A Currency in DOLLARS CREW ID: NAT99A UPB ID: UP99EA

ewis County Bottomland Rest	QUANTY	UOM	CREW	ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
Lands and Damages						0	0	0	1,250,000	1,250,000	
Habitat & Feeding Facilities											
Project Management											
Forestry Plan	1.00	EA			0.00	0	0	0	25,000	25,000	25000
Project Management						0	0	0	25,000	25,000	
TREES/PLANTS/GROUND COVER											
Priority 1 Area											
Priority 1 Reforestation	250.00	ACR			0.00	26,875	0	18,232	10,750	55,857	223.43
Reforest 60% of Priority 1 land aquisition.											
Assume Trees are available from the State Nursery.											
Trees are planted approximately 430 per acre.											
Costs: Bareroot Seedlings are $0.16/tree, or $68.80/acre.											
Labor is $0.25/tree, or $107.5/acre.											
Herbicide treatment is $43.00/acre.											
Priority 1 Area	250.00	ACR				26,875	0	18,232	10,750	55,857	223.43
Priority 2 Area											
Priority 2 Reforestation	300.00	ACR			0.00	32,250	0	21,878	12,900	67,028	223.43

Reforest 12% of Priority 1 land aquisition.

Assume Trees are available from the State Nursery.

Trees are planted approximately 430 per acre.

Costs:
Bareroot Seedlings are

ABOR ID: FTCAMP EQUIP ID: NAT97A Currency in DOLLARS CREW ID: NAT99A UPB ID: UP99EA

ewis County Bottomland Rest	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
$0.16/tree, or $68.80/acre.										
Labor is $0.25/tree, or $107.5/acre.										
Herbicide treatment is $43.00/acre.										
Priority 2 Area	300.00	ACR			32,250	0	21,878	12,900	67,028	223.43
TREES/PLANTS/GROUND COVER					59,125	0	40,110	23,650	122,885	
Mobilization										
Mobilization	1.00	LS		0.00	0	0	0	15,100	15,100	15100
Mobilization					0	0	0	15,100	15,100	
Habitat & Feeding Facilitie					59,125	0	40,110	63,750	162,985	
Planning, Engineering & Des					0	0	0	31,100	31,100	
Engineering During Construc					0	0	0	2,500	2,500	
Construction Management					0	0	0	16,000	16,000	
Lewis County Bottomland Res					59,125	0	40,110	1,363,350	1,462,585	
Kentucky					59,125	0	40,110	1,363,350	1,462,585	
Lewis County					59,125	0	40,110	1,363,350	1,462,585	

ABOR ID: FTCAMP EQUIP ID: NAT97A Currency in DOLLARS CREW ID: NAT99A UPB ID: UP99EA

		QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
03	Kentucky						
03-02	Lewis County Bottomland Restorat						
03-02{ 0100	Lands and Damages			1,250,000	302,579	1,552,579	
03-02{ 0603	Fish & Wildlife Facilities and			203,440	50,860	254,300	
03-02{ 3000	Planning, Engineering & Design			33,600	6,720	40,320	
03-02{ 3100	Construction Management			16,000	3,200	19,200	
TOTAL	Lewis County Bottomland Restorat			1,503,040	363,359	1,866,399	
TOTAL	Kentucky			1,503,040	363,359	1,866,399	
TOTAL	Lewis County			1,503,040	363,359	1,866,399	

ABOR ID: FTCAMP EQUIP ID: NAT97A Currency in DOLLARS CREW ID: NAT99A UPB ID: UP99EA

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
03 Kentucky					
03-02 Lewis County Bottomland Restorat					
03-02{ 0100 Lands and Damages					
03-02{ 010001 Lands and Damages		1,250,000	302,579	1,552,579	
TOTAL Lands and Damages		1,250,000	302,579	1,552,579	
03-02{ 0603 Fish & Wildlife Facilities and					
03-02{ 060373 Habitat & Feeding Facilities					
03-02{ 060373}2 Project Management		31,205	7,801	39,007	
03-02{ 060373}3 TREES/PLANTS/GROUND COVER		153,387	38,347	191,733	
03-02{ 060373}4 Mobilization		18,848	4,712	23,560	
TOTAL Habitat & Feeding Facilities		203,440	50,860	254,300	
TOTAL Fish & Wildlife Facilities and		203,440	50,860	254,300	
03-02{ 3000 Planning, Engineering & Design					
03-02{ 300001 Planning, Engineering & Design		31,100	6,220	37,320	
03-02{ 300002 Engineering During Construction		2,500	500	3,000	
TOTAL Planning, Engineering & Design		33,600	6,720	40,320	
03-02{ 3100 Construction Management					
03-02{ 310001 Construction Management		16,000	3,200	19,200	
TOTAL Construction Management		16,000	3,200	19,200	
TOTAL Lewis County Bottomland Restorat		1,503,040	363,359	1,866,399	

TOTAL Kentucky	1,503,040	363,359	1,866,399
TOTAL Lewis County	1,503,040	363,359	1,866,399

ABOR ID: FTCAMP EQUIP ID: NAT97A Currency in DOLLARS CREW ID: NAT99A UPB ID: UP99EA

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o errors detected...

* * * END OF ERROR REPORT * * *

ABOR ID: FTCAMP EQUIP ID: NAT97A Currency in DOLLARS CREW ID: NAT99A UPB ID: UP99EA

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o Backup Reports...

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EXHIBIT H-6

July 2000

PRELIMINARY FINAL REPORT

INCREMENTAL ANALYSIS OF THE LEWIS COUNTY BOTTOMLAND RESTORATION PROJECT, KENTUCKY

Submitted to

U.S. Army Corps of Engineer
Louisville District
Louisville, Kentucky

Submitted by

Federal Programs Division
Baton Rouge, Louisiana

July 2000

PRELIMINARY FINAL REPORT

Contract No. DACW27-99-D-0019
Delivery Order No. 0004
GEC Project No. 22321304

INCREMENTAL ANALYSIS OF THE LEWIS COUNTY BOTTOMLAND RESTORATION PROJECT, KENTUCKY

Submitted to

U.S. Army Corps of Engineers
Louisville District
Louisville, Kentucky

Submitted by

G.E.C., Inc.
Baton Rouge, Louisiana

Engineering Economics Transportation Technology Social Analysis Environmental Planning

P.O. Box 84010 Baton Rouge, Louisiana 70884-4010 (225) 612-3000 Fax (225) 612-3016
9357 Interline Avenue Baton Rouge, Louisiana 70809-1910

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1.0 INTRODUCTION, PURPOSE AND NEED

This work presents an incremental analysis of the costs and benefits of the Ohio River ecosystem restoration project KY31 – Lewis County Bottomland Restoration, a feasibility level study associated with a proposed ecosystem restoration program for the Ohio River. This study serves as an example incremental analysis for various ecosystem components considered as part of the program. The Corps has been involved in a large ecosystem restoration study of the Ohio River extending from Cairo, Illinois, to Pittsburgh, Pennsylvania. The Louisville, Huntington, and Pittsburgh districts are currently working with other Federal agencies and six states to develop an array of ecosystem restoration projects.

The proposed Lewis County Bottomland Restoration project is located northeast of the town of Covedale, in Lewis County, Kentucky. The project area is located between Ohio River miles 391 and 396 and is within the jurisdiction of the Huntington District, U.S. Army Corps of Engineers (USACE).

The Ohio River borders the northern edge of the project site between river miles 391 and 395. Some small ponds and embayments exist on the bottomland area adjacent to the Ohio River. The floodplain area is primarily agricultural with a mixture of pasture, hayfield, and row crops. A narrow band of riparian vegetation exists along a low terrace of the Ohio River floodplain. Most of the jurisdictional wetlands in the project area are located in the riparian zone adjacent to the Ohio River.

The primary goal of the Lewis County Bottomland Restoration project is the acquisition, restoration, and reforestation of bottomland hardwoods and the restoration of a riparian corridor along the Ohio River. Long-term restoration efforts will include reforestation of bottomland hardwoods, development of seasonally flooded impoundments, and the restoration of natural systems throughout the floodplain.

A portion of the floodplain area will be reforested with a mixture of mast-producing bottomland hardwood trees, and the entire area will be managed to provide habitat diversity for game and non-game wildlife. A portion of the project area will be maintained as open habitat for warm season grasslands, food plots, or other wildlife openings. Future development would include the construction/development of moist soil units and/or other wetlands.

Three proposed alternatives were designed to meet the principal goals of the project.

2.0 PROPOSED ALTERNATIVES

2.1 No-Action

The proposed project site is presently farmed for agricultural crops. If the No-Action Alternative is chosen, the project site would continue to be farmed. There would be no loss of terrestrial habitat with the implementation of this alternative.

2.2 Alternative 1. Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland

Under this alternative, approximately 785 acres of floodplain land that lies between State Route 8 and the Ohio River would be acquired. The acquisition area excludes public utilities, roads, railroads, cemeteries, residences, and other features, which would not be readily restored to a natural state. All lands will be acquired from willing sellers.

Approximately 470 of the acquired acres (60 percent) would be reforested. Soil types, hydrology, exposure, and terrain position would be the primary factors considered when selecting the tree species to be planted, and a detailed planting design should be developed in order to insure that the planting effort is successful. Typical species to be planted in the bottom/floodplain area would include pin oak (*Quercus palustris*), swamp chestnut oak (*Quercus michauxii*), swamp white oak (*Quercus bicolor*), pecan (*Carya illinoensis*), and shagbark hickory (*Carya ovata*). Aggressive light-mast-producing species, such as silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), and/or black willow (*Salix nigra*), would be expected to regenerate naturally.

It is anticipated that it will require eight years to acquire all of the lands from willing sellers and to reforest the acreage.

2.3 Alternative 2. Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland

Similar to Alternative 1, under this alternative, approximately 785 acres of floodplain land that lies between State Route 8 and the Ohio River would be acquired. The acquisition area excludes public utilities, roads, railroads, cemeteries, residences, and other features, which would not be readily restored to a natural state. All lands will be acquired from willing sellers.

Approximately 625 of the acquired acres, or 80 percent of the land acquired, would be reforested. Soil types, hydrology, exposure, and terrain position would be the primary factors considered when selecting the tree species to be planted, and a detailed planting design should be developed in order to insure that the planting effort is successful. Typical species to be planted in the bottom/floodplain area would include pin oak, swamp chestnut oak, swamp white oak, pecan, and shagbark hickory. Aggressive-light-mast producing species, such as silver maple, green ash, sycamore, and/or black willow, would be expected to regenerate naturally.

It is anticipated that it will require eight years to acquire all of the lands from willing sellers and to reforest the acreage.

2.4 Alternative 3. Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland

Under this alternative, approximately 390 acres of floodplain land that lies between the Chesapeake and Ohio Railroad and the Ohio River would be acquired. The Chesapeake and Ohio Railroad lies between State Route 8 and the Ohio River. The acquisition area excludes public utilities, roads, railroads, cemeteries, residences, and other features, which would not be readily restored to a natural state. All lands will be acquired from willing sellers.

Approximately 235 of the acquired acres (60 percent) would be reforested. Soil types, hydrology, exposure, and terrain position would be the primary factors considered when selecting the tree species to be planted, and a detailed planting design should be developed in order to insure that the planting effort is successful. Typical species to be planted in the bottom/floodplain area would include pin oak, swamp chestnut oak, swamp white oak, pecan, and shagbark hickory. Aggressive-light-mast producing species, such as silver maple, green ash, sycamore, and/or black willow, would be expected to regenerate naturally.

It is anticipated that it will require eight years to acquire all of the lands from willing sellers and to reforest the acreage.

3.0 COST ANALYSIS

3.1 Introduction

This section presents the findings of a cost effectiveness and incremental cost analysis of No-Action and the three alternatives under consideration. These cost analyses are not intended to determine the best alternative, but rather to provide decision-makers with a comparison of alternatives that produce different levels of environmental outputs and to assist in selecting the alternative that best satisfies project objectives. The analyses are intended to improve the quality of decision-making when considering alternative plans.

The cost effectiveness and incremental cost analysis was conducted in accordance with guidelines contained in EC 1105-2-206, entitled *Project Modification for Improvement of the Environment*, which is the same guidance as EC 1105-2-210, dated June 1, 1995, entitled *Ecosystem Restoration in the Civil Works Program;* EC 1105-2-214, dated October 3, 1998, entitled *Project Modifications for Improvement and Aquatic Ecosystem Restoration;* and Institute for Water Resources report *Evaluation of Environmental Investments Procedures Manual Interim: Cost Effectiveness and Incremental Cost Analyses*, dated May 1995 (IWR Report 95-R-1).

The Institute for Water Resources (IWR) has developed IWR-PLAN Decision Support Software to assist with the formulation and comparison of alternative plans of environmental restoration projects. IWR-PLAN assists in plan formulation by combining solutions to planning problems and calculating the additive effects of each alternative or combination of alternatives. When developing a combination of alternatives, IWR-PLAN includes each alternative in the combination, assigning either an action or no-action status to each. For instance, when evaluating a project with three alternatives, IWR-PLAN calculates the total environmental output for implementing Alternative 1 as the output associated with implementing Alternative 1 plus the output (if any) associated with no-action under alternatives 2 and 3.

IWR-PLAN assists in plan formulation and comparison of alternatives by conducting cost effectiveness and incremental cost analyses. IWR-PLAN was used in conducting the cost effectiveness and incremental cost analyses for the Lewis County Bottomland Restoration Project.

As the name indicates, cost effectiveness analysis is a method for comparing alternative plans that produce environmental outputs and determining which plan can produce the largest quantity of output for a given cost, or produce the same or greater quantity of output for less cost. Cost

effectiveness analysis determines if: (1) the same environmental output level could be produced by another plan at less cost; (2) a larger environmental output level could be produced at the same cost; or (3) a larger environmental output level could be produced at less cost. For instance, if two alternatives produce the same amount of environmental outputs, the alternative with the lowest cost is considered cost effective. Likewise, if the costs of two alternatives are equal, but one produces more outputs than the other, the one producing the higher level of outputs would be the cost effective alternative. Also, an alternative that costs less and produces higher levels of output is considered to be cost effective compared to higher cost alternatives producing lower levels of output.

Incremental cost analysis builds on the findings of the cost effectiveness analysis. This is accomplished by comparing the increase in costs to the increase in outputs that are associated with advancing from one output level (one cost effective alternative) to the next higher output level (another cost effective alternative).

3.2 Cost Estimates of Alternatives

To conduct cost effectiveness and incremental cost analyses, the total cost of implementing each alternative must be estimated and stated on an average annual basis. Preliminary cost estimates for alternatives presented in the feasibility report were obtained from the Microcomputer Aided Cost Estimating System (MCACES) cost estimates developed as part of the feasibility report and additional cost elements (real estate, plans and specifications, and supervision and administration during construction). Cost estimates for alternatives developed as part of this analysis were based on MCACES per-unit costs presented in the feasibility report and calculated quantities.

3.2.1 Alternative 1. Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland.

The total estimated cost associated with implementing Alternative 1 is $44,166 (Table 3-1). The primary activity included in these costs is development of a reforestation plan. Also included in the costs are contingencies, plans and specifications, and interest incurred during the development of the reforestation plan. Interest costs are based on the federal discount rate of 6.625 percent and a schedule of one year to develop the reforestation plan.

Land acquisition and the reforestation of a portion of those lands are anticipated to occur over an eight-year period. Therefore, land acquisition and reforestation costs were assumed to occur over the first eight years of the project and are not included in the gross investment costs. Land acquisition costs were estimated at $1,556,295, and reforestation of 470 acres is estimated at $134,171. These costs were evenly distributed over the first eight years of the project, then discounted to their net present value and amortized over the life of the project.

Table 3-1. Lewis County Bottomland Restoration Project, Alternative 1, Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland, Cost Estimate

Item	Costs
Reforestation Costs	
Develop Reforestation Plan	$25,000
Contingencies	$1,750
Plans and Specifications	$16,000
Cost Subtotal	$42,750
Interest During Development of Reforestation Plan	$1,416
Gross Investment	$44,166

Sources: Ohio River Mainstream Ecosystem Restoration Project – Feasibility Report; Louisville District, USACE; and G.E.C., Inc.

3.2.2 Alternative 2. Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland. The total estimated cost associated with implementing Alternative 2 is $44,166 (Table 3-2). The primary activity included in these costs is development of a reforestation plan. Also included in the costs are contingencies, plans and specifications, and interest incurred during the development of the reforestation plan. Interest costs are based on the federal discount rate of 6.625 percent and a schedule of one year to develop the reforestation plan.

Land acquisition and the reforestation of a portion of those lands are anticipated to occur over an eight-year period. Therefore, land acquisition and reforestation costs were assumed to occur over the first eight years of the project and are not included in the gross investment costs. Land acquisition costs were estimated at $1,556,295, and reforestation of 625 acres is estimated at $168,163. These costs were evenly distributed over the first eight years of the project, then discounted to their net present value and amortized over the life of the project.

Table 3-2. Lewis County Bottomland Restoration Project, Alternative 2, Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland, Cost Estimate

Item	Costs
Reforestation Costs	
Develop Reforestation Plan	$25,000
Contingencies	$1,750
Plans and Specifications	$16,000
Cost Subtotal	$42,750
Interest During Development of Reforestation Plan	$1,416
Gross Investment	$44,166

Sources: Ohio River Mainstream Ecosystem Restoration Project – Feasibility Report; Louisville District, USACE; and G.E.C., Inc.

3.2.3 Alternative 3. Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland.

The total estimated cost associated with implementing Alternative 3 is $44,166 (Table 3-3). The primary activity included in these costs is development of a reforestation plan. Also included in the costs are contingencies, plans and specifications, and interest incurred during the development of the reforestation plan. Interest costs are based on the federal discount rate of 6.625 percent and a schedule of one year to develop the reforestation plan.

Table 3-3. Lewis County Bottomland Restoration Project, Alternative 3, Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland, Cost Estimate

Item	Costs
Reforestation Costs	
Develop Reforestation Plan	$25,000
Contingencies	$1,750
Plans and Specifications	$16,000
Cost Subtotal	$42,750
Interest During Development of Reforestation Plan	$1,416
Gross Investment	$44,166

Sources. Ohio River Mainstream Ecosystem Restoration Project – Feasibility Report; Louisville District, USACE; and G.E.C., Inc.

Land acquisition and the reforestation of a portion of those lands are anticipated to occur over an eight-year period. Therefore, land acquisition and reforestation costs were assumed to occur over the first eight years of the project and are not included in the gross investment costs. Land acquisition costs were estimated at $773,370, and reforestation of 235 acres is estimated at $82,636. These costs were evenly distributed over the first eight years of the project, then discounted to their net present value and amortized over the life of the project.

3.3 Average Annual Cost

Table 3-4 presents a summary of the cost estimates for the three alternatives. The average annual cost of implementing each alternative, assuming a 50-year project life and a federal discount rate of 6.625 percent, is also presented. Although the feasibility study states that the reforested areas will be managed for natural resources by the Ohio Department of Natural Resources (DNR) in perpetuity, for the purpose of the incremental cost analysis, the project life was assumed to be 50 years. The average annual cost is the annual amount required to amortize the present value of project costs over the life of the project. It is equivalent to the annual payment needed to finance the project over 50 years at 6.625 percent interest.

The average annual cost of Alternative 1, Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland, is $91,448. This includes an average annual cost of gross investment of $3,049 and average annual costs for land acquisition and reforestation of $88,399. The land acquisition and reforestation costs are based on costs of $1,690,466 expected to be incurred over the first eight years

Table 3-4. Lewis County Bottomland Restoration Project, Summary of Construction and O & M Costs for Each Alternative

Item	Alternative 1	Alternative 2	Alternative 3
Gross Investment	$44,166	$44,166	$44,166
Annualized Gross Investment Cost	$3,049	$3,049	$3,049
Annualized O&M Costs	$88,399	$90,176	$44,763
Total Annualized Costs	$91,448	$93,225	$47,812

Sources: Ohio River Mainstream Ecosystem Restoration Project - Feasibility Report; Louisville District, USACE; and G.E.C., Inc.

of the project. These costs are discounted to their net present value, then amortized over the life of the project.

The average annual cost of Alternative 2, Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland, is $93,225. This includes an average annual cost of gross investment of $3,049 and average annual costs for land acquisition and reforestation of $90,179. The land acquisition and reforestation costs are based on costs of $1,724,458 expected to be incurred over the first eight years of the project. These costs are discounted to their net present value, then amortized over the life of the project.

The average annual cost of Alternative 3, Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland, is $47,812. This includes an average annual cost of gross investment of $3,049 and average annual costs for land acquisition and reforestation of $44,763. The land acquisition and reforestation costs are based on costs of $856,006 expected to be incurred over the first eight years of the project. These costs are discounted to their net present value, then amortized over the life of the project.

3.4 Environmental Benefits

Environmental impacts associated with no-action and each alternative were measured in habitat acres. Because of resource and time constraints, field surveys could not be conducted to define the impact of each alternative. Therefore, environmental impacts were estimated using information provided in the feasibility report. Extensive field surveys would be required to more accurately quantify the environmental impacts of each alternative.

3.4.1. Alternative 1. Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland. The proposed project calls for the acquisition of 785 acres of bottomlands along the left-descending bank of the Ohio River. Of these 785 acres, approximately 470 acres (60 percent) will be reforested with a mixture of mast-producing bottomland hardwood tree species. The species to be planted will depend on the terrain, soil type, and hydrology, which will be more closely evaluated in the detailed

reforestation plan to be developed at a later date. Reforestation would be performed in the most suitable areas throughout the entire project site. This would create open fields scattered throughout the project site that would total 315 acres. These open fields would be managed as open grasslands for utilization by a variety of song bird, game bird, and grazing wildlife species. In the future, it is proposed that some of these open fields would be converted to moist soil units for waterfowl utilization. The reforestation would provide approximately 470 acres of high-quality overwintering, foraging, and nesting habitat for various game and non-game wildlife species. During flood events on the Ohio River, these forested lands would provide spawning, nursery, and foraging habitat for many species of fishes, reptiles, and amphibians. In addition, these flooded areas would provide foraging and brood-rearing habitat for many waterfowl species. The remaining portion of the land acquisition will be managed as open warm season grasslands.

3.4.2. Alternative 2. Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland. Alternative 2 proposes to acquire approximately 785 acres of bottomlands along the left-descending bank of the Ohio River. Approximately 625 acres (80 percent) of this area would be reforested with a mixture of mast producing bottomland hardwood tree species. The actual areas and species to be planted within the 785 acres would be dependent on the terrain, soil types, and hydrology of the site. These reforestation efforts would provide approximately 628 acres of forested terrestrial habitat and 160 acres of open field habitat, which would be managed as open warm season grasslands. By increasing the acreage of reforestation, the acreage of open grasslands as well as the area to be managed as moist soil units in the future would decrease by half compared to Alternative 1.

3.4.3. Alternative 3. Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland. Alternative 3 calls for the acquisition of approximately 390 acres of bottomlands between the Chesapeake and Ohio Railroad and the Ohio River. Approximately 235 acres (60 percent) of this area would be reforested with a mixture of mast-producing bottomland hardwood tree species. The actual areas and species to be planted within the 390 acres would be dependent on the terrain, soil types and hydrology of the site. The bottomland hardwood forests created would provide 235 acres of overwintering, foraging, and nesting habitat for various game and non-game wildlife species. The remaining 55 acres would be managed as open grasslands, which would provide foraging habitat for many song bird, game bird and grazing wildlife species. The reforestation would also create a riparian habitat along the bank of the Ohio River, which would provide bank stabilization and protection from the currents of the river. In addition, this riparian habitat would provide spawning, nursery, and foraging habitat for many species of fishes, reptiles, and amphibians, as well as foraging and brood-rearing habitat for many waterfowl species during extended flood events on the river.

3.4.5. Summary of Environmental Benefits

Table 3.5 presents a summary of the environmental benefits expected to occur in each year of the project for each alternative. Also presented are the cumulative impacts and the average annual impacts for each alternative.

Under Alternative 1, Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland, no action results in no significant impacts. Implementing the alternative results in the creation of 785 acres of reforested and open habitat. However, it will require eight years for the land to be acquired and redeveloped at a rate of 98.1 acres a year. This results in an average annual increase of 730.1 acres. For Alternative 2, Acquisition of 785 Acres and Reforestation of 625 Acres of

Table 3-5. Summary of Annual Environmental Benefits Associated With Each Alternative, Lewis County Bottomland Restoration Project

Year	Alternative 1	Alternative 2	Alternative 3
1	98.1	98.1	48.8
2	196.3	196.3	97.5
3	294.4	294.4	146.3
4	392.5	392.5	195.0
5	490.6	490.6	243.8
6	588.8	588.8	292.5
7	686.9	686.9	341.3
8	785.0	785.0	390.0
9	785.0	785.0	390.0
10	785.0	785.0	390.0
11	785.0	785.0	390.0
12	785.0	785.0	390.0
13	785.0	785.0	390.0
14	785.0	785.0	390.0
15	785.0	785.0	390.0
16	785.0	785.0	390.0
17	785.0	785.0	390.0
18	785.0	785.0	390.0
19	785.0	785.0	390.0
20	785.0	785.0	390.0
21	785.0	785.0	390.0
22	785.0	785.0	390.0
23	785.0	785.0	390.0
24	785.0	785.0	390.0
25	785.0	785.0	390.0
26	785.0	785.0	390.0
27	785.0	785.0	390.0
28	785.0	785.0	390.0
29	785.0	785.0	390.0
30	785.0	785.0	390.0
31	785.0	785.0	390.0
32	785.0	785.0	390.0
33	785.0	785.0	390.0
34	785.0	785.0	390.0
35	785.0	785.0	390.0
36	785.0	785.0	390.0
37	785.0	785.0	390.0
38	785.0	785.0	390.0
39	785.0	785.0	390.0
40	785.0	785.0	390.0
41	785.0	785.0	390.0
42	785.0	785.0	390.0
43	785.0	785.0	390.0
44	785.0	785.0	390.0
45	785.0	785.0	390.0
46	785.0	785.0	390.0
47	785.0	785.0	390.0
48	785.0	785.0	390.0
49	785.0	785.0	390.0
50	785.0	785.0	390.0
Cumulative Total	36,502.5	36,502.5	18,135.0
Average Annual	730.1	730.1	362.7

Source: GEC, Inc.

Bottomland, no action results in no significant impacts. Implementing the alternative results in the creation of 785 acres of reforested and open habitat. However, it will require eight years for the land to be acquired and redeveloped, at a rate of 98.1 acres a year. This results in an average annual increase of 730.1 acres. Under Alternative 3, Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland, no-action results in no significant impacts. Implementing the alternative results in the creation of 390 acres of reforested and open habitat. However, it will require eight years for the land to be acquired and redeveloped at a rate of 48.8 acres a year. This results in an average annual increase of 362.7 acres.

3.5 Relationship Among Alternatives

The three alternatives cannot be effectively combined. The alternatives consist of acquiring and reforesting various quantities of bottomlands at the same location along the Ohio River. Therefore, only one of the alternatives can effectively be implemented. IWR-PLAN requires that each alternative be assigned costs and outputs associated with both implementing and not implementing the alternative. The cost for not implementing an alternative (No-Action) is $0. The environmental outputs associated with not implementing an alternative (No-Action) are the quantity of habitat that would be impacted (lost) over the life of the project if the alternative is not implemented. These values are calculated in terms of average annual impacts, which are the cumulative number of acres impacted each year by the project divided by 50, the number of years the project will exist. The No-Action outputs are entered into IWR-PLAN as negative values (lost habitat).

The cost of implementing each alternative is stated in average annual costs and includes construction costs, and operation and maintenance costs. The environmental outputs associated with implementing each alternative are calculated as the quantity of habitat created by the alternative and the quantity of habitat protected from loss if the alternative were not implemented (the No-Action negative impacts). Because of the method that IWR-PLAN uses to combine alternatives to derive the various combinations of alternatives, the impacts associated with implementing the alternative must be entered into the program as net impacts. Net impacts for each alternative are calculated as the impacts associated with implementing the alternative minus the No-Action impacts.

When developing the combination of alternatives, IWR-PLAN includes each alternative in the combination and assigns either an action or no-action status to each. For instance, the IWR-PLAN derived output from implementing Alternative 1 is actually calculated as the combination of the net impacts of the action of Alternative 1 (730.1 acres) and the no-action impacts of Alternative 2 (0 acres) and Alternative 3 (0 acres), resulting in a combined impact of 730.1 acres.

Including No-Action, a total of four actual combinations of alternatives exist.

3.6 Cost Effectiveness Analysis

Cost effectiveness analysis is intended to illustrate which alternatives can produce the same amount of environmental output for less cost or a larger quantity of output for the same or less cost. Table 3-6 presents the average annual cost, annual environmental outputs, and average cost per output for each combination of alternatives. The cost-effective combinations are: No-Action; Alternative 1; and Alternative 3. These alternatives are presented in bold type in Table 3-6.

Table 3-6. Lewis County Bottomland Restoration Project,
Cost Effectiveness Analysis

Alternative	Outputs (Acres)	Costs ($1,000)	Average Cost ($/Acres)
No-Action	**0.0**	**0.00**	**0**
Alternative 1	**730.1**	**91.45**	**125**
Alternative 2	730.1	93.23	127
Alternative 3	**362.7**	**47.81**	**132**

Source: G.E.C., Inc.

3.7 Incremental Cost Analysis

Incremental cost analysis illustrates the increase in costs associated with advancing from one output level to the next higher output level. Table 3-7 presents the average annual cost, the annual environmental output, the average cost of output, the incremental output, and the total and per unit incremental cost of the "best buy" alternatives.

Table 3-7. Lewis County Bottomland Restoration Project,
Incremental Cost Analysis of Increasing Output from the No-Action Alternative
For the "Best Buy" Alternative

Alternative	Outputs (Acres)	Costs ($1,000)	Average Cost ($/Acres)	Incremental Cost ($1,000)	Incremental Output (Acres)	Incremental Cost Per Output ($)
Alternative 1	730.1	91.45	125	91,450	730.1	125

Source: G.E.C., Inc.

Alternative1 is considered the "best buy" alternative, or the alternative that would generate the most output for any additional money expended. The average cost per habitat acre for Alternative 1 is $125, which is also the incremental cost per acre. A total of 730.1 average annual beneficial habitat acres are produced under this alternative. The total annual incremental cost, the increase in costs from No-Action, is $91,450.

Alternative 1 generates 730.1 average annual acres of habitat at an annual cost of $91,450. This equates to a cost of $125 ($91,450/730.1) per acre of output. The other cost-effective alternative, Alternative 3, produces a total of 362.7 average annual acres at an annual cost of $47,810. This equates to a cost of $132 ($47,810/362.7) per acre of output. Alternative 1 produces more output at a lower per unit cost, making it a "better buy" than Alternative 2. For this reason, Alternative 1 is considered the "best buy" plan.

4.0 SUMMARY AND CONCLUSION

This report presents an incremental analysis on the Lewis County Bottomland Restoration Project, which is associated with a proposed ecosystem restoration program for the Ohio River. The Lewis County Bottomland Restoration Project is located northeast of the town of Covedale, in Lewis County, Kentucky, between Ohio River miles 391 and 396. The primary goal of the Lewis County Bottomland Restoration Project is the acquisition, restoration, and reforestation of bottomland hardwoods and the restoration of a riparian corridor along the Ohio River. Three alternatives were evaluated as part of the restoration project and include: Alternative 1, Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland; Alternative 2, Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland; and Alternative 3, Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland.

Under Alternative 1, Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland, approximately 785 acres of Ohio River bottomland habitat would be acquired, and 60 percent of the area would be reforested with a mixture of mast-producing bottomland hardwood trees. This alternative would provide habitat diversity for game and non-game wildlife and provide warm season grasslands, food plots, or other wildlife openings.

Under Alternative 2, Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland, approximately 785 acres of Ohio River bottomland habitat would be acquired, and 80 percent of the area would be reforested with a mixture of mast-producing bottomland hardwood trees. This alternative would provide habitat diversity for game and non-game wildlife and provide warm season grasslands, food plots, or other wildlife openings.

Under Alternative 3, Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland, approximately 390 acres of Ohio River bottomland habitat would be acquired, and 60 percent of the area would be reforested with a mixture of mast-producing bottomland hardwood trees. This alternative would provide habitat diversity for game and non-game wildlife and provide warm season grasslands, food plots, or other wildlife openings.

The following subsections provide a summary of impacts, as well as the cost effectiveness analysis.

4.1 Environmental Benefits

4.1.1. Alternative 1. Acquisition of 785 Acres and Reforestation of 470 Acres of Bottomland. Acquiring 785 acres of Ohio River bottomland and reforesting 470 of those acres with a mixture of mast-producing bottomland hardwood trees will provide habitat for game and non-game wildlife and warm season grasslands, and food plots or other wildlife openings. If this alternative is implemented, a total of 785 acres of habitat will be created over the first eight years of the project. Because it will require an estimated eight years for the entire 785-acre area to be acquired, the average annual impact over the life of the project will be 730.1 acres. There will be no direct loss of habitat for no-action under this alternative.

4.1.2. Alternative 2. Acquisition of 785 Acres and Reforestation of 625 Acres of Bottomland. Acquiring 785 acres of Ohio River bottomland and reforesting 625 of those acres with a mixture of mast-producing bottomland hardwood trees will provide habitat for game and non-game wildlife and

warm season grasslands, and food plots or other wildlife openings. If this alternative is implemented, 785 acres of habitat will be created over the first eight years of the project. Because it will require eight years for the entire 785-acre area to be acquired, the average annual impact over the life of the project will be 730.1 acres. There will be no direct loss of habitat for no-action under this alternative.

4.1.3. Alternative 3. Acquisition of 390 Acres and Reforestation of 235 Acres of Bottomland. Acquiring 390 acres of Ohio River bottomland and reforesting 235 of those acres with a mixture of mast-producing bottomland hardwood trees will provide habitat for game and non-game wildlife and warm season grasslands, and food plots or other wildlife openings. If this alternative is implemented, 390 acres of habitat would be created over the first eight years of the project. Because it will require eight years for the entire 390-acre area to be acquired, the average annual impact over the life of the project will be 362.7 acres. There will be no direct loss of habitat for no-action under this alternative.

4.2 Cost Effectiveness and Incremental Cost Analysis

Cost effectiveness and incremental cost analyses were conducted for the alternatives in order to provide decision-makers with information to choose the alternatives that best satisfy project objectives. The environmental outputs of the alternatives were measured in habitat acres. Cost effectiveness analysis compared alternative plans that produces environmental outputs and determined which plan produces the largest quantity of output for a given cost, or produce the same or greater quantity of output for less cost. The cost-effective alternatives are: No-Action; Alternative 1; and Alternative 3.

Incremental cost analysis compares the increase in costs (of cost-effective alternatives) of advancing from one output level to the next higher level of output to the increase in outputs. The resulting “best buy” alternative is Alternative 1. The average cost per habitat acre for Alternative 1 is $125, which is also the incremental cost per acre. A total of 730.1 average annual beneficial habitat acres are produced under this alternative. The total annual incremental cost, the increase in costs from No-Action, is $125.